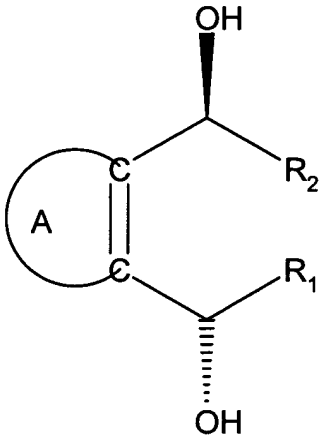
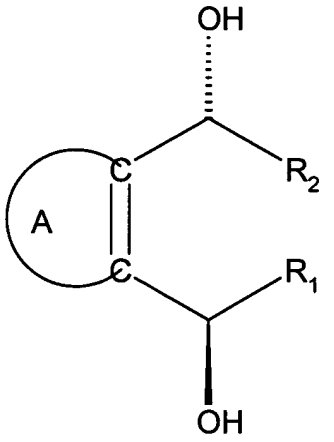
1. (currently amended): A ~~method~~ process for the preparation of C_2-symmetric 1,4-diols of the formula IVA or IVB having a high enantiomeric purity



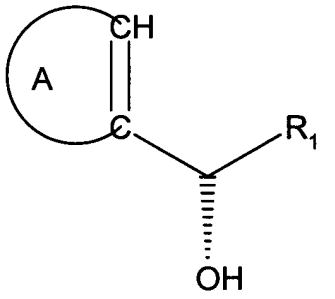
(IVA)



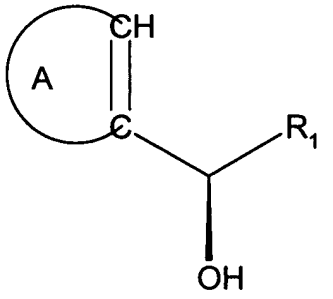
(IVB)

wherein ring A which includes the shown double bond forms a mono-, di- or polycyclic aromatic or heteroaromatic ring and R_1 and R_2 are, independently of each other, an organic moiety,

the process ~~or method~~ comprising reacting an α-(aryl or heteroaryl)-α-substituted alkanol compound of the formula IA (for the synthesis of a compound of the formula IVA) or IB (for the synthesis of a compound of the formula IVB)

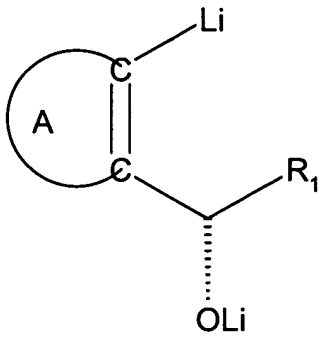


(IA)

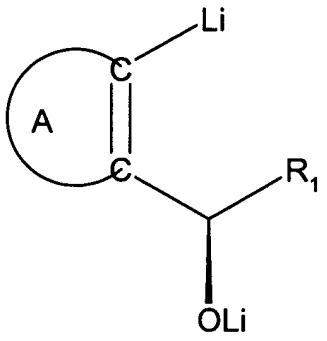


(IB)

wherein ring A and R_1 are as defined under formula IVA and IVB, with a lithiating reagent, obtaining an intermediate of the formula IIA (from IA) or IIB (from IB),



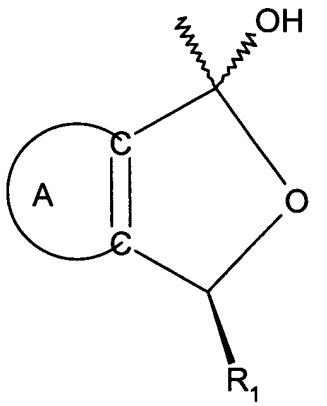
(IIA)



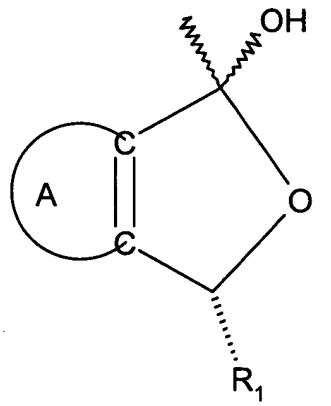
(IIB)

wherein ring A and R_1 have the meanings given under compounds of the formulae IVA and IVB.

2. (currently amended): The process according to claim 1, further comprising reacting the lithiated product of the formula IIA or IIB, respectively, with an N,N-di-alkyl-formamide to form a hemiacetal compound of the formula IIIA (from IIA) or IIIB (from IIB),



(IIIA)



(IIIB)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA and IVB, and subsequently with a Grignard reagent of the formula R_2MgX wherein R_2 is an organic moiety and X is halogen or, alternatively, using corresponding lithium, zinc or other metal comprising compounds that allow for introduction of R_2; to yield the corresponding compounds of formula IVA (from IIIA) and IVB (from IIIB).

3. (currently amended): The ~~method~~ process according to claim 1, further comprising reacting an aldehyde of the formula VI

$$R_2\text{-}CH{=}O \qquad (VI)$$

wherein R_2 is as defined for compounds of the formulae IVA and IVB, with the intermediate of the formula IIA to yield a compound of the formula IVA or of the formula IIB to yield a compound of the formula IVB.

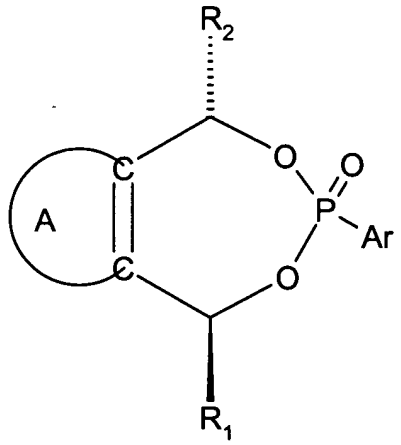
4. (original): A compound of the formula IVA or IVB as shown in claim 1 having a high enantiomeric purity, wherein ring A, R_1 and R_2 are as defined in claim 1, with the proviso that R_1 and R_2 are not simultaneously methyl or ethyl.

5. (currently amended): A process for the preparation of a ligand of the formula XA, XA*, XB or XB* given below,

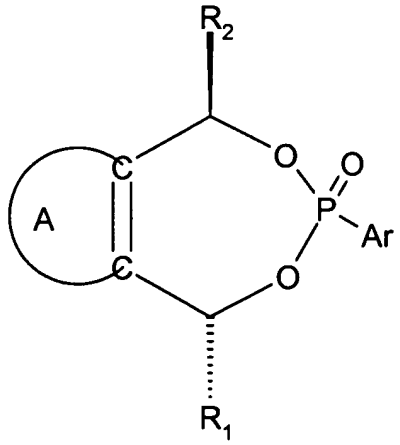
said process comprising reacting a compound of the formula IVA (for the synthesis of a compound of the formula XA) or IVB (for the synthesis of a compound of the formula XB) obtained according to ~~any one of claims~~ claim 1 ~~to 3~~ with an aryl phosphinic acid halogenide of the formula VII;

$$Ar\text{-}P(=O)(Hal)_2 \qquad (VII)$$

wherein Ar is aryl~~, especially phenyl,~~ and Hal is halogen, ~~especially chloro,~~ in the presence of a base resulting in the formation of a phosphonate ester compound of the formula VIIIA (from IVA) or VIIIB (from IVB), respectively,



(VIIIA)



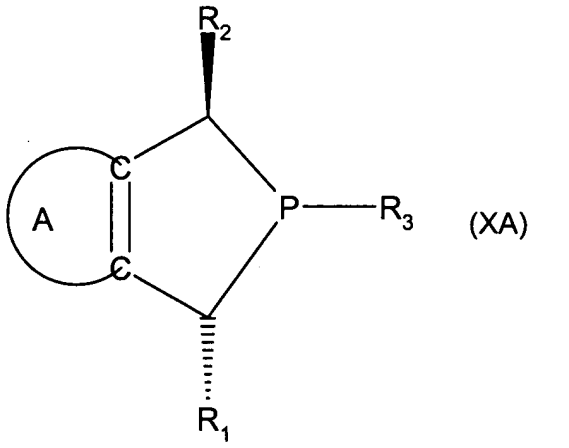
(VIIIB)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA and IVB and Ar is aryl, and then reacting a compound of the formula VIIIA or VIIIB with a phosphine of the formula IX or IX*,

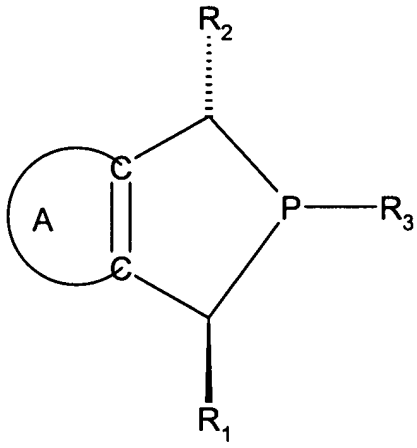
R_3-PH_2 (IX)

H_2P-R_3*-PH_2 (IX*)

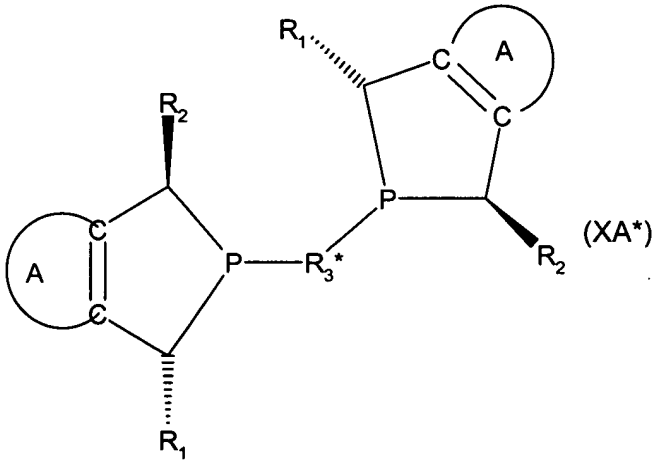
(or the corresponding borane adduct thereof) wherein R_3 is a monovalent, and R_3* is a bivalent organic moiety that can be bound to phosphorus, resulting in a phospholane compound of the formula XA or XA* (from VIIIA); or XB or XB* (from VIIIB), respectively,



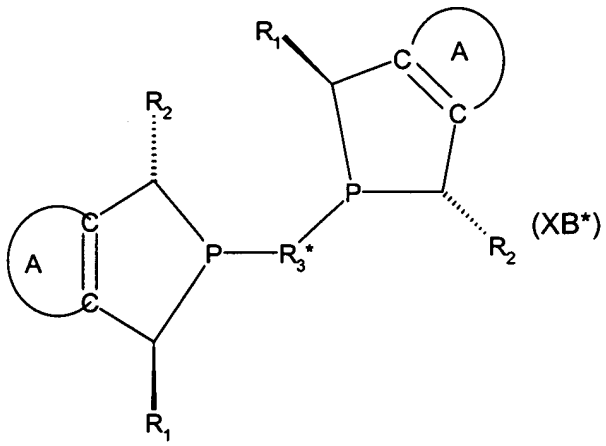
(XA)



(XB)



(XA*)



(XB*)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA or IVB and R_3 or R_3* is as defined under formulae IX and IX*, respectively.

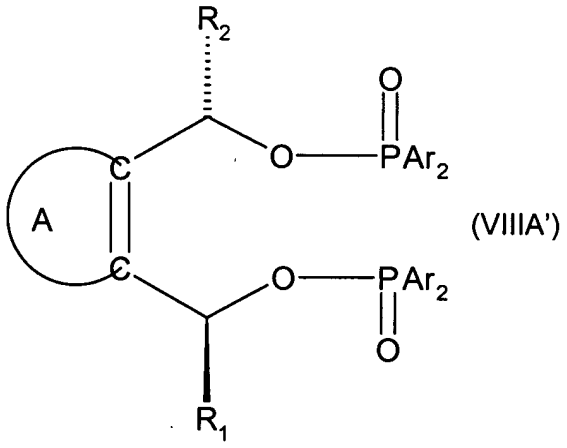
6. (original): A ligand of the formula XA, XA*, XB or XB*, as shown and defined in claim 5.

7. (original): A transition metal complex comprising a ligand of the formula XA, XA*, XB or XB*, as shown and defined in claim 5.

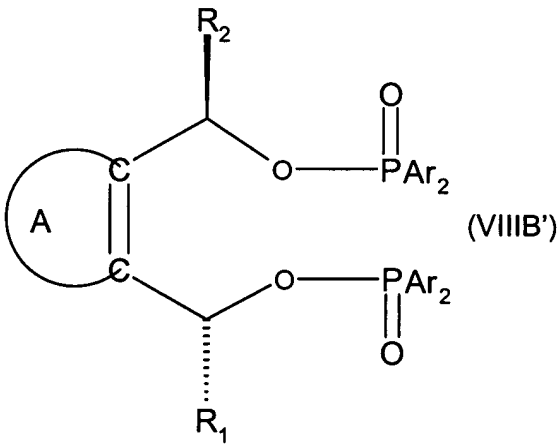
8. (currently amended): A process for the preparation of a ligand of the formula XA, XA*, XB or XB* given below,
said process comprising reacting a compound of the formula IVA (for the synthesis of a compound of the formula XA) or IVB (for the synthesis of a compound of the formula XB) obtained according to ~~any one of claims~~ claim 1 ~~to 3~~ with an aryl phosphinic acid halogenide of the formula VII';

$Ar_2P(=O)Hal$ (VII')

wherein Ar is aryl~~, especially phenyl,~~ and Hal is halogen, ~~especially chloro,~~ in the presence of a base resulting in the formation of a compound of the formula VIIIA' (from IVA) or VIIIB' (from IVB), respectively,



(VIIIA')



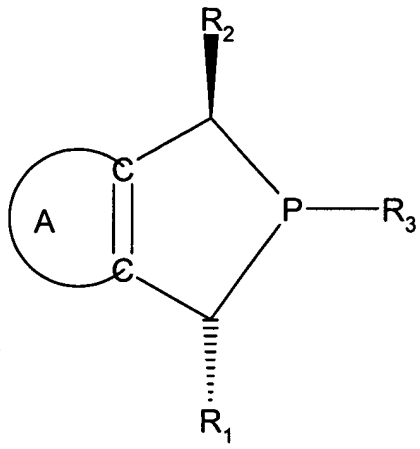
(VIIIB')

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA and IVB in claim 1 and Ar is aryl, and then reacting a compound of the formula VIIIA' or VIIIB' with a phosphine of the formula IX or IX*,

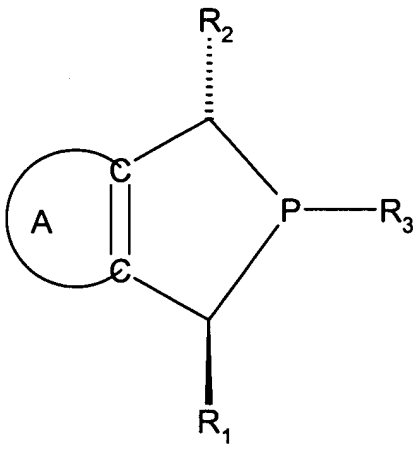
R_3-PH_2 (IX)

$H_2P\text{-}R_3^*\text{-}PH_2$ (IX*)

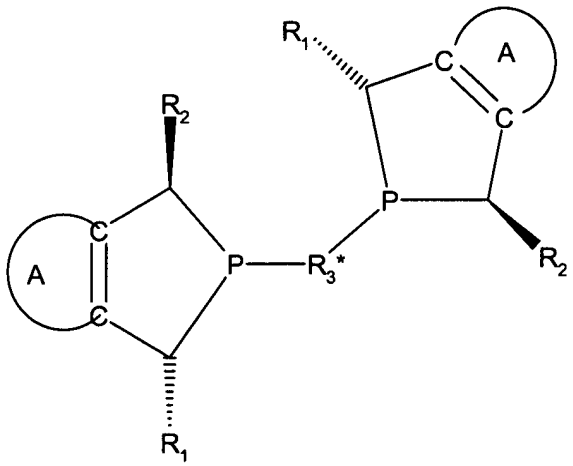
(or the corresponding borane adduct thereof) wherein R_3 is a monovalent, and R_3^* is a bivalent organic moiety that can be bound to phosphorus, resulting in a phospholane compound of the formula XA or XA* (from VIIIA); or XB or XB* (from VIIIB), respectively,



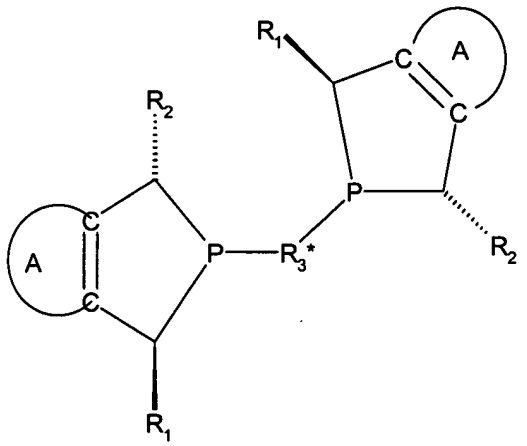
(XA)



(XB)



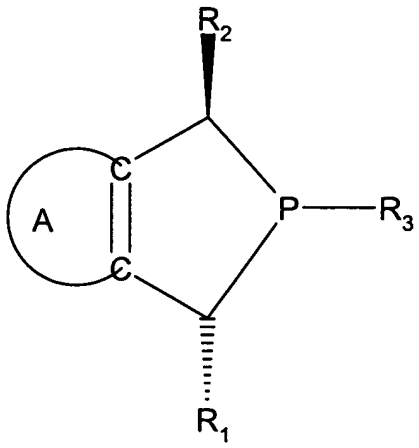
(XA*)



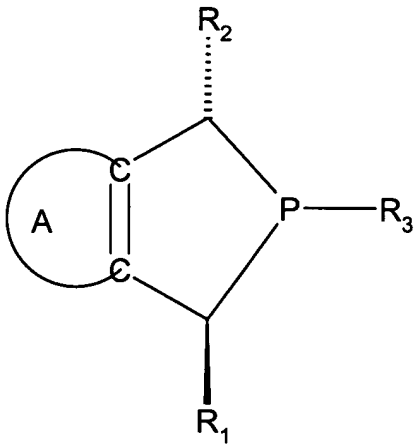
(XB*)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA or IVB in claim 1 and R_3 or R_3^* is as defined under formulae IX and IX*, respectively.

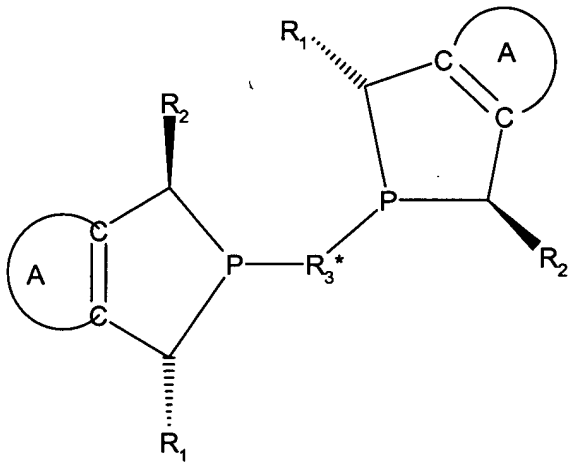
9. (currently amended): A process for the preparation of a compound of the formula XA, XA*, XB or XB*,



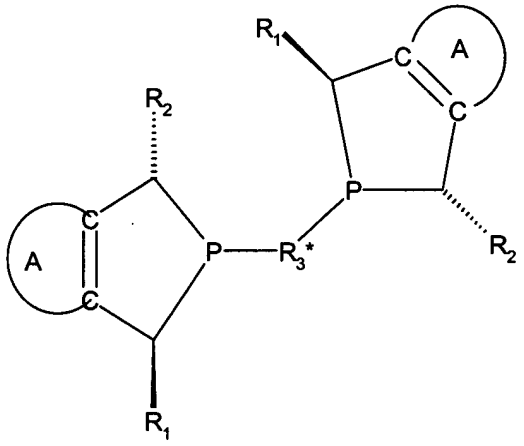
(XA)



(XB)



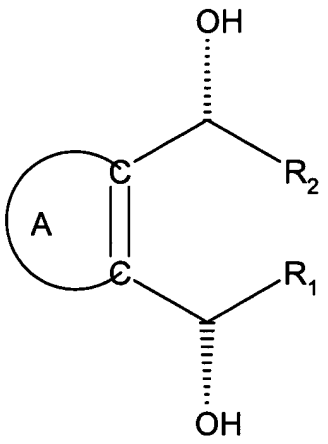
(XA*)



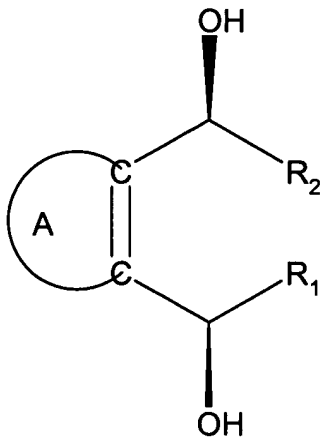
(XB*)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA or IVB in claim 1 and R_3 or R_3* is as defined under formulae IX and IX*, respectively

said process comprising reacting a compound of the formula IVA or IVB given in claim 1, or a mixture of a compound of the formula IVA and VA, or of a compound of the formula IVB and VB,

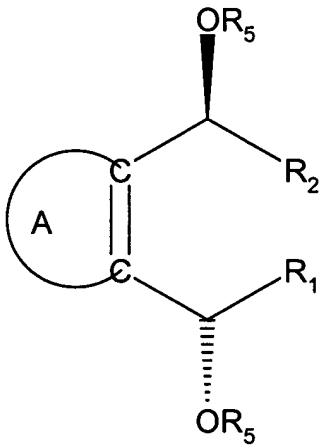


(VA)

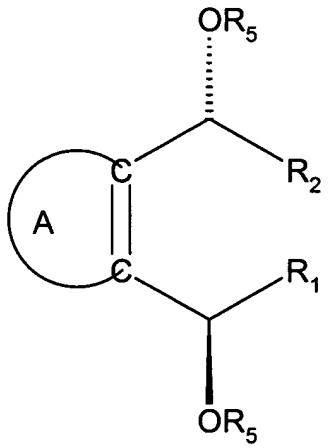


(VB)

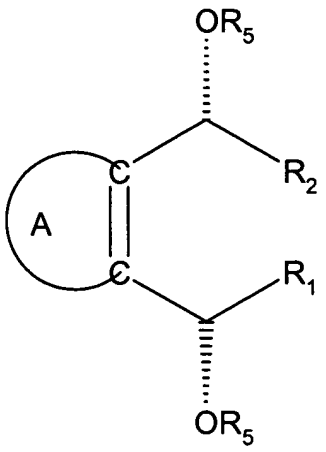
wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA and IVB, with an agent introducing an acyl protecting group, obtaining the corresponding bis-hydroxy-protected compounds of the formula IVA* (from IVA), IVB* (from IVB), or mixtures of a compound of the formula IVA* and VA* (from a mixture of a compound of the formula IVA and VA) or of a compound of the formula IVB* and VB* (from a mixture of a compound of the formula IVB and VB),



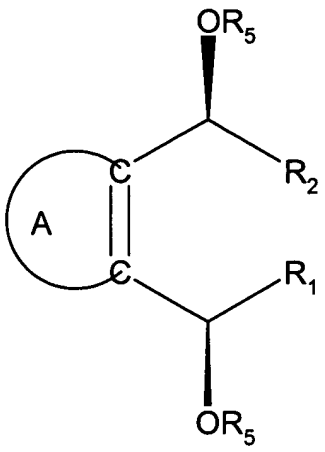
(IVA*)



(IVB*)



(VA*)



(VB*)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA and IVB and R_5 is acyl, an then reacting the compound or compounds to the corresponding compounds of the formulae XA shown above with a compound of the formula IX,

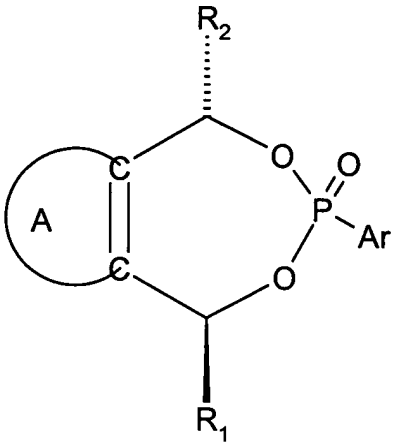
$$R_3\text{-}PH_2 \qquad (IX)$$

or a borane adduct thereof, wherein R_3 is a monovalent organic moiety that can be bound to phosphorus,
or for a compound of the formula XA* shown above with a compound of the formula IX*,

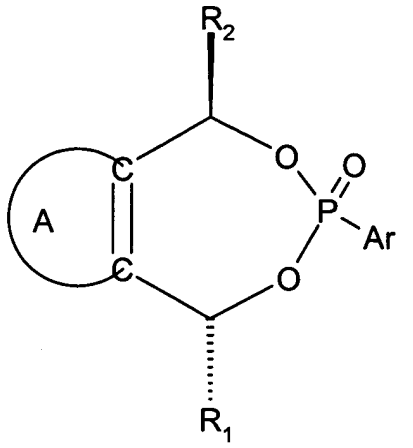
$$H_2P\text{-}R_3^*\text{-}PH_2 \qquad (IX^*)$$

or a borane adduct thereof, wherein R_3^* is a bivalent organic moiety that can be bound to phosphorus, in both cases starting from a compound of the formula IVA*(alone or ~~less preferably~~ optionally in mixture with a compound of the formula VA*);
or of the formula XB shown above with a compound of the formula IX shown above or a borane adduct thereof, or to a compound of the formula XB* shown above with a compound of the formula IX* shown above or a borane adduct thereof, in both cases starting from a compound of the formula from IVB* (alone or ~~less preferably~~ optionally in mixture with a compound of the formula VB*),
in the case of mixtures of compounds of the formula IVA* and VA* or IVB* and VB* ~~preferably~~ optionally after isolating the compounds of the formula IVA* or IVB*, respectively, from the undesired enantiomer of the formula VA* or VB*.

10. (currently amended): The process according to claim 9, further comprising reacting the compound of the formula



(VIIIA)



(VIIIB)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA and IVB in claim 9 and Ar is aryl, ~~VIIIA or VIIIB~~ with a phosphine of the formula IX or IX*,

R_3-PH_2 (IX)

H_2P-R_3*-PH_2 (IX*)

(or the corresponding borane adduct thereof) wherein R_3 is a monovalent~~,~~ and R_3* a bivalent organic moiety that can be bound to phosphorus, resulting in a phospholane compound of the formula XA or XA* (from VIIIA); or XB or XB* (from VIIIB) shown in claim ~~5~~ 9, respectively.

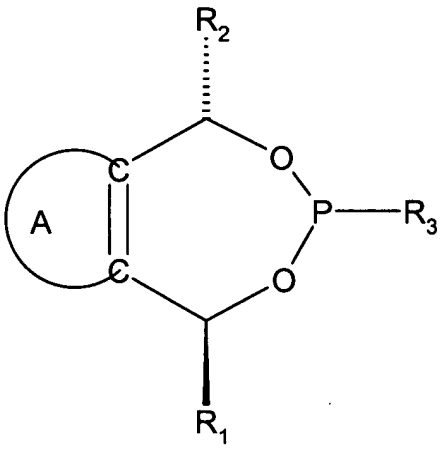
11. (currently amended): A process for the preparation of a ligand of the formula XIIA or XIIA* shown below from a compound of the formula IVA as defined in claim 1 or of the formula XIIB or XIIB* shown below from a compound of the formula IVB as defined in claim 1,
comprising

a) reacting a compound of the formula IVA or IVB with a compound of the formula XI or XI*,

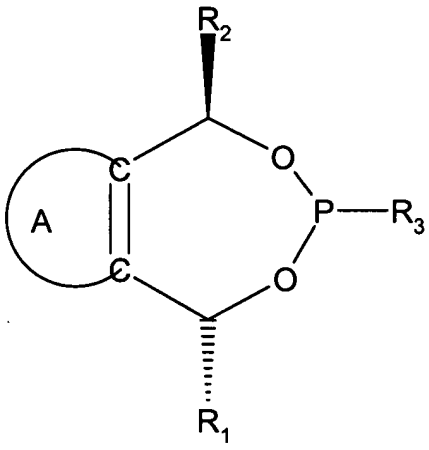
R_3-$P(L)_2$ (XI)

$(L)_2$-P-R_3*-P-$(L)_2$ (XI*)

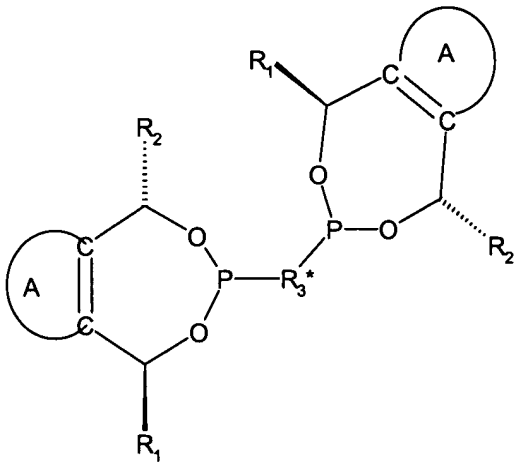
wherein R_3 is a monovalent, and R_3* a bivalent organic moiety that can be bound to phosphorus and L is a leaving group, leading to ligands of the formula XIIA or XIIA* (from IVA) and/or XIIB or XIIB* (from IVB),



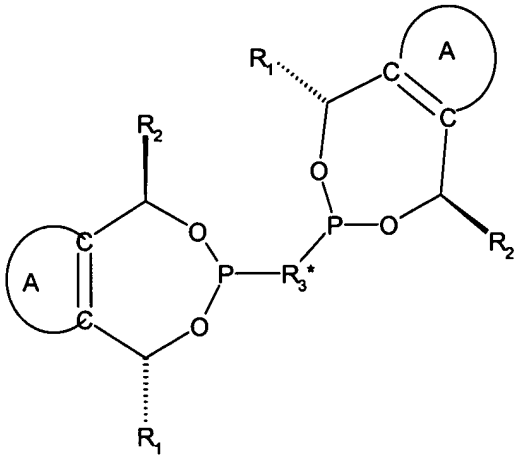
(XIIA)



(XIIB)



(XIIA*)



(XIIA*)

wherein ring A, R_1 and R_2 have the meanings indicated for compounds of the formula IVA and IVB in claim 1 and R_3 is a monovalent, and R_3* a bivalent organic moiety that can be bound to phosphorus; or

b) reacting a compound of the formula IVA or IVB with a compound of the formula XI** or XI***,

R_3-P[N(alk)$_2$]$_2$ (XI**)

[(alk)$_2$N]$_2$P-R_3*-P[N(alk)$_2$]$_2$ (XI***)

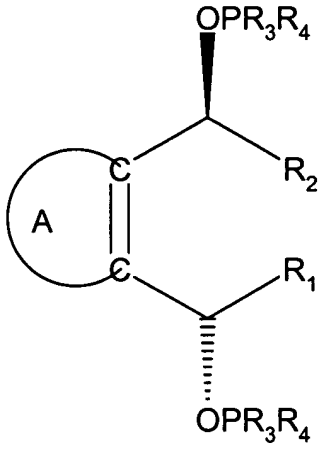
wherein R_3 is a monovalent, and R_3* a bivalent organic moiety and

alk is alkyl which can be linear or cyclic, ~~especially lower alkyl, in particular methyl, ethyl, I propyl or butyl, or~~ is a heterocyclic radical, ~~under~~ with removal of the secondary amine $HN(alk_2)_2$, yielding the compound of formula XIIA or XIIA* (from IVA); or XIIB or XIIB* (from IVB) described above, respectively.

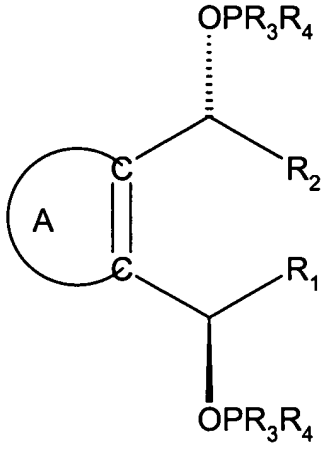
12. (original): A ligand of the formula XIIA, XIIA*, XIIB or XIIB*, as shown in claim 11.

13. (original): A transition metal complex comprising a ligand of the formula XIIA, XIIA*, XIIB or XIIB*, as shown in claim 11.

14. (currently amended): A process for the preparation of a ligand of the formula XIVA from a compound of the formula IVA or of the formula XIVB from a compound of the formula IVB,



(XIVA)



(XIVB)

wherein ring A, R_1 and R_2 are as defined for compounds of the formula ~~XIVA~~ IVA or ~~XIVB~~ IVB in claim 1 and R_3 and R_4 each are, independently of the other, an organic moiety that can be bound to phosphorus,

said process comprising reacting a compound of the formula IVA or VIB given in claim 1, respectively, with

a) a compound of the formula XIII,

$$R_3R_4P\text{-}L \qquad \text{(XIII)}$$

wherein R_3 and R_4 are organic moieties that can be bound to phosphorus and L is a leaving group, resulting in a compound of the formula XIVA (from IVA) or XIVB (from IVB), respectively; or

b) with a compound of the formula XIII*,

$$R_3R_4PN(alk)_2 \qquad (XIII^*)$$

wherein R_3 and R_4 are, independently form each other, an organic moiety and alk is alkyl which can be linear or cyclic, ~~especially lower alkyl, in particular methyl, ethyl, I-propyl or butyl,~~ or is a heterocyclic radical, ~~under~~ with removal of the amine $H_2N(alk)_2$.

15. (original): A ligand of the formula XIVA or XIVB, as shown in claim 14.

16. (original): A transition metal complex comprising a ligand of the formula XIVA or XIVB, as shown in claim 14.

17. (cancelled).